TABLE 2.—*Free-air resultant winds (meters per second) based on pilot balloon observations made near 7 a.m. (E.S.T.) during February 1933*

[Wind from N=360°; E=90°, etc.]

Altitude (meters) m.s.l.	Albuquerque, N. Mex. (1,554 meters)		Atlanta, Ga. (309 meters)		Bismarck, N.Dak. (518 meters)		Brownsville, Tex. (12 meters)		Burlington, Vt. (132 meters)		Cheyenne, Wyo. (1,873 meters)		Chicago, Ill. (192 meters)		Cleveland, Ohio (245 meters)		Dallas, Tex. (154 meters)		Havre, Mont. (762 meters)		Jacksonville, Fla. (14 meters)		Key West, Fla. (11 meters)	
	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity
	°		°		°		°		°		°		°		°		°		°		°		°	
Surface	357	1.2	320	1.6	306	2.2	89	0.6	222	1.7	273	5.8	276	2.3	245	3.6	257	0.2	242	4.2	343	1.6	93	2.2
500			325	1.4			123	3.8	252	6.0			275	5.7	256	7.2	349	.1			34	.3	114	4.5
1,000			273	4.9	293	10.5	163	3.0	281	7.0			280	9.4	266	11.0	283	3.3	264	7.6	279	2.0	144	4.7
1,500			273	8.7	298	12.8	218	3.0	283	9.6			273	10.3	269	12.5	273	5.9	282	12.0	277	7.3	167	3.2
2,000	310	3.3	284	11.3	292	13.3	238	5.3	305	11.6	272	8.3	279	12.3	271	14.7	283	9.2	298	13.4	274	9.1	203	2.8
2,500	291	5.9	276	9.0	290	13.9	239	4.1	289	12.2	277	13.9	293	14.8	273	16.9	281	13.1	293	13.3	271	10.6	214	3.2
3,000	282	9.1	302	8.6	283	12.4	238	7.6			292	16.2	274	11.8	287	16.4	273	17.0	287	13.2			216	4.8
4,000	274	14.5									285	16.0											265	4.5
5,000	264	14.7																						

Altitude (meters) m. s. l.	Los Angeles, Calif. (217 meters)		Medford, Oreg. (410 meters)		Memphis, Tenn. (83 meters)		New Orleans, La. (25 meters)		Oakland, Calif. (8 meters)		Oklahoma City, Okla. (402 meters)		Omaha, Nebr. (306 meters)		Phoenix, Ariz. (356 meters)		Salt Lake City, Utah (1,294 meters)		Sault Ste. Marie, Mich. (198 meters)		Seattle, Wash. (14 meters)		Washington, D.C. (10 meters)	
	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity
	°		°		°		°		°		°		°		°		°		°		°		°	
Surface	343	1.4	290	0.6	277	0.5	37	1.8	28	1.8	308	0.7	233	0.7	89	0.3	178	1.9	285	1.0	148	2.0	275	1.9
500	19	1.4	330	.6	239	2.3	57	2.4	358	3.6	213	1.0	241	2.9	45	1.0			275	3.3	215	3.9	274	7.2
1,000	29	2.1	231	1.0	251	3.9	291	1.7	359	6.6	260	4.6	272	7.0	38	1.8			282	6.0	269	3.3	290	9.9
1,500	355	2.8	252	3.5	260	6.7	264	3.6	345	6.7	270	6.4	278	9.5	241	.5	189	3.7	273	7.2	295	3.5	294	12.1
2,000	338	4.1	285	4.5	272	9.4	258	5.8	345	7.4	275	8.8	281	10.8	264	2.4	224	3.2	288	9.9	302	5.3	288	14.3
2,500	330	6.4	322	7.9	276	12.0			340	9.0	273	10.2	283	12.7	270	3.9	273	4.8	273	11.8	327	6.6	286	14.3
3,000	337	6.7	330	10.4	283	13.8			335	9.1	275	13.0	282	13.3	270	5.5	284	6.8			329	10.6	282	14.2
4,000	338	5.7	333	13.1					319	9.7	270	15.9	278	13.2	282	10.0	294	7.7						
5,000															282	7.1								

RIVERS AND FLOODS

By MONTROSE W. HAYES

[In charge River and Flood Division]

In February 1933 floods occurred in Michigan, the South Atlantic, Gulf, and Ohio Valley States, and in Oregon and Idaho. Several of those in the South Atlantic and Gulf States were still in progress at the close of the month. With the exception of the one in the Tallahatchie River, in Mississippi, which will be discussed in a later issue of the MONTHLY WEATHER REVIEW, none was of much importance. In all instances the damage was slight.

The floods in the Grand River in Michigan were caused by ice gorges.

Table of flood stages in February 1933

[All dates in February unless otherwise specified]

River and station	Flood stage	Above flood stages—dates: From—	Above flood stages—dates: To—	Crest: Stage	Crest: Date
ST. LAWRENCE DRAINAGE					
Grand: Portland, Mich	*Feet* 12	26	26	*Feet* 12.0	26.
ATLANTIC SLOPE DRAINAGE					
Roanoke: Williamston, N.C	10	15	28	10.5	19–27.
Peedee:					
Mars Bluff Bridge, S.C	17	13	26	18.6	24.
Poston, S.C	18	18	28	18.4	23–26.
Black: Kingstree, S.C	10	12	Mar. 1	11.2	19, 20.
Santee:					
Rimini, S.C	12	Jan. 26	5	13.7	Jan. 29.
		9	(1)	15.2	24.
Ferguson, S.C	12	Jan. 26	7	13.3	Jan. 31.
		9	(1)	13.7	24–27.
Savannah: Ellenton, S.C	14	Jan. 26	6	17.5	Jan. 29.
		9	(1)	19.5	23.

[1] Continued into March.

Table of flood stages in February 1933—Continued

River and station	Flood stage	Above flood stages—dates: From—	Above flood stages—dates: To—	Crest: Stage	Crest: Date
ATLANTIC SLOPE DRAINAGE—contd.					
Ogeechee:	*Feet*			*Feet*	
Dover, Ga	7	8	(1)	8.1	22–24.
Meldrim, Ga	9	9	(1)	10.6	26–28.
Ocmulgee: Abbeville, Ga	11	16	19	11.3	18.
		23	(1)	13.4	27.
Altamaha:					
Charlotte, Ga	12	Jan. 28	(1)	16.5	28.
Everett City, Ga	10	11	(1)	10.8	21–25.
EAST GULF OF MEXICO DRAINAGE					
Apalachicola: Blountstown, Fla	15	Jan. 28	(1)	20.4	25.
Cahaba: Centerville, Ala	23	8	8	23.7	8.
		20	20	25.0	20.
Alabama:					
Selma, Ala	35	22	26	38.2	24.
Millers Ferry, Ala	35	21	(1)	42.4	25, 26.
Tombigbee:					
Aberdeen, Miss	34	9	10	34.5	10.
Lock No. 4, Demopolis, Ala	39	10	Mar. 3	49.5	22.
Lock No. 3, Ala	33	9	Mar. 5	52.4	22.
Lock No. 2, Ala	46	12	Mar. 3	54.4	23.
Lock No. 1, Ala	31	11	Mar. 9	37.0	25, 26.
Pearl: Jackson, Miss	20	8	(1)	25.0	16, 17.
West Pearl: Pearl River, La	13	1	7	14.1	2.
		14	(1)	15.2	28.
MISSISSIPPI SYSTEM					
Upper Mississippi Basin					
Illinois: Peru, Ill	14	Jan. 22	5	14.8	4.
		8	20	15.4	8.
		23	Mar. 5	16.5	24.
Ohio Basin					
Barren: Bowling Green, Ky	20	21	23		

Table of flood stages in February 1933—Continued

River and station	Flood stage	Above flood stages—dates		Crest	
		From—	To—	Stage	Date
MISSISSIPPI SYSTEM—continued					
Ohio Basin—Continued					
Green:	*Feet*			*Feet*	
Munfordville, Ky	28	21	23	29.4	22.
Lock No. 6, Brownsville, Ky	28	22	23	28.1	22, 23.
Lock No. 4, Woodbury, Ky	33	17	26	39.4	23.
Lock No. 2, Rumsey, Ky	34	23	(1)	36.7	27.
West Fork of White: Edwardsport, Ind.	12	27	28	13.6	28.
White: Decker, Ind	18	Jan. 24	4	21.8	Jan. 28, 29.
Wabash: Mt. Carmel, Ill	16	Jan. 23	2	20.9	Jan. 28, 29.
Cumberland:					
Carthage, Tenn	40	22	22	40.8	22.
Nashville, Tenn	40	20	26	45.0	21.
Clarksville, Tenn	46	21	27	50.6	22.
Lock F, Eddyville, Ky	50	21	Mar. 3	58.0	27.
North Fork of Holston: Mendota, Va.	8	15	15	8.0	15.
Pigeon: Newport, Tenn	6	8	9	7.1	8.
		15	16	10.3	15.
French Broad: Dandridge, Tenn	12	15	16	13.9	15.
Elk: Fayetteville, Tenn	14	14	18	23.5	14.
		20	21	17.6	20.
Tennessee:					
Rockwood, Tenn	20	16	17	21.6	16.
Chattanooga, Tenn	30	17	18	32.6	17.
Bridgeport, Ala	18	16	23	23.0	18.
Guntersville, Ala	25	17	25	31.1	20.
Florence, Ala	18	18	24	21.1	21.
Riverton, Ala	33	15	27	41.9	22.
Savannah, Tenn	32	16	27	41.7	23.
Johnsonville, Tenn	31	20	28	34.3	24.

[1] Continued into March.

Table of flood stages in February 1933—Continued

River and station	Flood stage	Above flood stages—dates		Crest	
		From—	To—	Stage	Date
MISSISSIPPI SYSTEM—continued					
Ohio Basin—Continued					
Ohio:	*Feet*			*Feet*	
Dam No. 50, Fords Ferry, Ky	32	25	Mar. 2	33.6	27.
Dam No. 52, Brookport, Ill	35	22	Mar. 4	39.2	28.
Dam No. 53, Grand Chain, Ill	38	23	Mar. 4	42.0	Mar. 1.
White Basin					
White: Georgetown, Ark	21	Jan. 25	4	22.1	Jan. 30.
Arkansas Basin					
Arkansas: Yancopin, Ark	29	5	13	29.7	10–11.
Red Basin					
Sulphur: Ringo Crossing, Tex	20	28	(1)	23.8	28.
Lower Mississippi Basin					
St. Francis: St. Francis, Ark	18	Jan. 23	3	22.3	Jan. 28.
Tallahatchie: Swan Lake, Miss	24	Dec. 16	(1)	33.0	26.
Yazoo: Yazoo City, Miss	25	8	(1)	25.8	28.
Atchafalaya Basin					
Atchafalaya: Atchafalaya, La	22	Jan. 10	(1)	22.9	11–19.
PACIFIC SLOPE DRAINAGE					
Columbia Basin					
Long Tom: Monroe, Oreg	10	Jan. 26	2	13.6	Jan. 28.
Snake: Weiser, Idaho	14	16	18	15.0	17.

WEATHER OF THE ATLANTIC AND PACIFIC OCEANS

[The Marine Division, W. F. McDonald in charge]

NORTH ATLANTIC OCEAN

By W. F. McDONALD

Atmospheric pressure.—There was a decided change in the average pressure situation over the North Atlantic in February 1933, as compared with the preceding month. Instead of a deeply depressed barometer over Iceland the average pressure at Reykjavik was almost half an inch above the February normal. At the same time the pressure over middle latitudes decreased, and the barometer at Horta averaged two tenths of an inch below normal. Pressures along the American coast were normal to a tenth of an inch below. (See table 1.)

Lowest pressures reported from ships at sea were, 28.59 inches, from the French S.S. *Paris*, near latitude 44° N., longitude 54° W., on the evening of February 5; and 28.56 inches (the lowest reported from any part of the Atlantic or adjacent land areas during the month) from the British S.S. *Majestic*, near latitude 42° N., longitude 57° W., on the morning of the 27th.

The highest readings reported from ships on the North Atlantic were 30.68 inches, from the American ships *Wytheville* and *Leviathan*, between 40° and 45° N., and 45° and 65° W., on the evening of the 10th and morning of the 11th.

Cyclones and gales.—Storminess diminished greatly in intensity over the North Atlantic in February. The alteration in average pressures, outlined above, reflects the lessening of the barometric gradient between the normal Atlantic HIGH, and the Icelandic LOW, that accompanied this reduction in gale intensities over the main trans-Atlantic routes. While winds of gale force occurred in some part of the ocean on nearly every day in the month, the force seldom exceeded Beaufort 9, and on only a few days were gales reported over wide areas.

TABLE 1.—*Averages, departures, and extremes of atmospheric pressure (sea level) at selected stations for the North Atlantic Ocean and its shores, February 1933*

Station	Average pressure	Departure	Highest	Date	Lowest	Date
	Inches	*Inch*	*Inches*		*Inches*	
Julianehaab, Greenland	30.03	------	30.79	27	29.14	13
Reykjavik, Iceland	29.98	+0.44	30.58	18	28.74	1
Lerwick, Shetland Islands	29.79	+.07	30.46	11	28.55	2
Valencia, Ireland	29.96	+.06	30.69	12	29.06	25
Lisbon, Portugal	30.10	.00	30.44	7	29.52	26
Madeira	30.02	−.05	30.37	7	29.62	24
Horta, Azores	29.95	−.20	30.48	10	29.52	25
Belle Isle, Newfoundland	29.77	+.02	30.58	11	28.82	16
Halifax, Nova Scotia	29.81	−.10	30.52	11	28.80	28
Nantucket	29.93	−.11	30.67	10	29.18	26
Hatteras	30.10	−.01	30.70	10	29.51	4
Bermuda	30.07	−.05	30.48	14	29.46	27
Turks Island	30.10	+.02	30.20	14	29.90	27
Key West	30.10	+.03	30.30	9	29.77	28
New Orleans	30.13	+.04	30.66	9	29.70	7
Cape Gracias, Nicaragua	29.95	−.04	30.04	15	29.84	27

NOTE.—All data based on a.m. observations only with departures compiled from best available normals related to time of observation, except Hatteras, Key West, Nantucket, and New Orleans, which are 24-hour corrected means.

Three ships experienced winds of force 12, as follows: the American S.S. *Montoso*, southwest of Bermuda, on the 4th; the Norwegian S.S. *Taurus*, about 600 miles south of Sable Island, on the 6th, and the American S.S. *West Quechee*, in a similar location, on the 27th. Whole gale to storm winds were encountered by a number of other vessels (as shown by the accompanying table) mostly between the 4th and 7th, the 16th to 18th, and on the 27th, which were the stormiest periods of the month on the main sailing routes.

Cyclonic storms of considerable intensity dominated the middle and northern areas of the North Atlantic during the first week, but the Atlantic HIGH was fully established by the 8th, and continued dominant until the middle of the month. The culmination of the cyclonic